COLUMBIA RIVER TECHNICAL MANAGEMENT TEAM
March 3, 2017
Facilitator's Summary
Facilitator: Emily Stranz; Notes: Charles Wiggins, DS Consulting

The following Facilitator's Summary is intended to capture basic discussion, decisions and actions, as well as point out future actions or issues that may need further discussion at upcoming meetings. These notes are not intended to be the "record" of the meeting, only a reminder for TMT members. Official minutes can be found on the TMT website: http://www.nwd-wc.usace.army.mil/tmt/agendas/2017/

Dworshak Update
Steve Hall, Corps, provided an update on Dworshak operations. He noted that the forebay is currently at 1,521.5ft, compared to 1,524.4ft at the last TMT meeting on March 01, 2017. The project is releasing around 12.3-.5 kcfs, inflow currently is around 7 kcfs, and TDG is between 118-19.2%.

The Official Water Supply Forecast for March is 2.867 MAF. This will require the April 1st elevation to be 1,493.1ft, and the April 15th elevation to be 1,471.1ft. This forecast does not reflect current low elevation snowpack. The National Weather Service 10-day forecast is for 5" of precipitation in the Dworshak basin, mostly as snow. If these predictions are accurate, it may result in a mid-March water supply forecast of closer to 3 MAF, equating to an April 15th reservoir elevation of 1,445ft. At this level, the reservoir would be "empty."

Both the Corps and FPS presented potential operational scenarios. Steve presented nine graphs, developed by the Corps and available on the TMT web site. The scenarios are based upon an assumption of 2.9 MAF water supply and all are targeting both the end of March and the April 15th flood control targets. Steve noted that if the forecast moves to 3 MAF, Dworshak operations would be required to discharge 25 kcfs from March 20th to April 15th to reach the 1,445ft target. He added that the objective of these potential operations is to position the reservoir to respond to both snowmelt and future "atmospheric river" conditions. Dworshak reservoir is a small "thimble" in the role it plays as it relates to system flood control. Flood control storage projects only have the ability to store about 25% of the runoff volume in the Columbia River because there is about six times as much inflow as storage. There is perhaps 30 MAF total flood storage capacity in the Columbia Basin, mostly in the upper basin.

Dave Statler, Nez Perce, commented that the current Northwest River Forecast Center prediction is for 2.7 MAF, which is a slight decrease from forecasts earlier this week. He noted that TMT should take into consideration the variability of these forecasts.

Dave Benner, Fish Passage Center, presented additional scenarios, which are available on the TMT web site. These scenarios present a longer-term look at the potential operations and use WY 1984 and 1985 as reference years. Dave explained that FPAC's preferred approach is illustrated in the fourth scenario and is based upon higher water inflow (year 1985), with an earlier runoff and aims to meet April 30th flood control targets instead of April 15th.

Paul Wagner, NOAA, shared that Salmon Managers' biggest concern at this point is the effect of high TDG on hatchery fish. Dave Swank, USFWS, reported that the hatchery managers came together to discuss options. They recognize the Corps' need to increase flow and request:

1. Stepping up flows incrementally, with 500cfs per day on business days, to allow the hatchery time to monitor the changes and impacts.
2. Due to concerns of gas bubble trauma, back off from increasing flows if TDG elevates to 105% in the hatchery.

Dave shared that the hatchery managers discussed potential hatchery management options: keep the fish on station; release them into the river early; or temporarily move them to another location. There are 1.6 million Spring Chinook smolts in the hatchery, with few options for moving, especially for brood year 2015 fish. He continued that additional hardware to pump oxygen into the ponds and raceways is not yet available, though it is being contracted for future years. Early release results in poor survival for small fish, so is a last resort. Thus, the preferred option is to keep the fish on station and closely monitor TDG levels. Currently, TDG levels at the hatchery are between 102-03%.

After a caucus, the Corps presented two alternatives, both linked to meeting the March 31st and April 15th flood control targets, and both lowering flow to 8kcfs for the late March hatchery fish release:

- → Increase flow immediately to 17 kcfs until the end of March, when flow would increase, probably to 21-25 kcfs, to meet the April 15th flood risk management (FRM) elevation.
- → Increase flow in daily increments of 1,000 cfs, beginning midnight March 2, 1017. Incremental increases would continue until approximately March 13th, when flow would be a predicted 22 kcfs. Then the Corps would reassess, reserving the right to go up more rapidly as the situation required. Steve noted that if the water supply forecast goes to 3 MAF in the future, operations would have to increase to 25kcfs.

The Corps noted that there is a fairly low probability that high outflows would be necessary in May (estimated 5-10% at 17 kcfs) unless this is an outlier year for wetness.

Jay Hesse, Nez Perce, requested that the Corps target the FRM elevation of April 30th, and consider recruiting assistance to deal with the problems at Dworshak from other parts of the system, such as Grand Coulee. The Corps noted that due to uncertainty of actual weather conditions so far in the future, they could not forecast to an April 30th rule elevation and need to manage the system for flood control.

After another caucus and conversation with Hatchery Managers, Salmon Managers stated that both of the options proposed by the Corps are detrimental to fish and will cause mortalities. In order to gather data to learn from this situation, they would rather the gradual increase over the instant increase in flow. It was acknowledged that there are no options available at this time that meet the needs of the fish and FRM.

- → **ACTION:** The Corps will increase flow in daily increments of 1,000 cfs, beginning at 8:00pm on March 3, 1017. Incremental increases will continue until the project outflow is 22kcfs. Then the Corps will reassess, reserving the right to go up more rapidly as the situation required to achieve FRM requirements.

TMT will reconvene at 0900 hours on Wednesday, March 8, 2017.

Columbia River Regional Forum
TECHNICAL MANAGEMENT TEAM OFFICIAL MINUTES

March 3, 2017
Minutes: Pat Vivian

1. Introduction

Representatives of Idaho, Nez Perce Tribe, USFWS, CRITFC/Umatilla, Montana, BOR, NOAA, BPA, COE, Yakama Nation, Washington, Oregon and others participated in today's TMT conference calls, one in the morning and another in the afternoon. Doug Baus, COE, chaired, and Emily Stranz, DS Consulting, facilitated the conversation.

2. Dworshak Update

Today's two unscheduled TMT meetings (9am to 12pm and 3 to 4pm) are a continuation of the ongoing TMT coordination associated with Dworshak Dam (DWR) Flood Risk Management Operations (FRM) and efforts to minimize Total Dissolved Gas (TDG) impacts on in-river and hatchery juveniles salmon downstream of DWR.

2a. Current Operational Data. Steve Hall, COE Walla Walla, reported. Dworshak reservoir is at 1521.5 ft elevation with 12.3-12.4 kcfs discharges. Inflows are 7 kcfs.

2b. Total Dissolved Gas Report for Dworshak. Current discharges of 12.3-12.5 kcfs are yielding 118-119.2% TDG saturation levels downstream of Dworshak Dam.

2c. Dworshak Volume Inflow Forecast. The COE's official March 1 forecast for April-July inflow volume is 2.867 maf, 118% of the 30 year average. The end of March FRM elevation is 1493.1 ft. Based on this forecast, the April 15 FRM elevation will be 1471.1 ft.

2d. NWRFC Water Supply Forecast. Hall gave a caveat: The COE's official water supply forecast might not reflect the actual amount of low elevation snowpack remaining in the basin. There are several indications of increased precipitation including the national RFC forecast of 5 inches over the next 10 days. If this forecast materializes, the Dworshak water supply forecast could increase to 3 maf by mid-March. With a 3 maf forecast, the April 15 FRM elevation will be 1445 ft, i.e. empty.

2e. Dworshak Operational Scenarios. Hall presented several modeling scenarios produced by the COE:

Scenario 1 based on STP inflows shows a 2 day reduction to 8 kcfs on March 27-28 for the combined hatchery release. To get down to the April 15 FRM elevation based

on the current water supply forecast, Dworshak discharges would have to increase to 19.5 kcfs.

Scenario 2 shows a flat discharge of 18.4 kcfs without the 2 day reduction to 8 kcfs for the hatchery release. Under this scenario, Dworshak would need to release about 18.4 kcfs based on STP inflows in order to reach the FRM elevation 1493 ft by March 31. This set of inflows doesn't reflect the current RFC forecast calling for peak inflows of 18 kcfs over the next 10 days. That would mean releasing 17 kcfs from Dworshak through end March and 21-22 kcfs for the first half of April. Past inflow traces from 1989 and 1990 had similar volume, but inflows then were more benign in March and aggressive in April. Under this scenario, Dworshak would release 18 kcfs.

Scenario 3 has discharges of 16.9 kcfs in March and 21.3 kcfs in April.

Scenario 4, based on 1989 inflows, has 18 kcfs releases with a drop to 8 kcfs for the 2 day hatchery release.

Scenario 5 shows 17 kcfs as a flat flow, operating to the end of March FRM elevation of 1493 ft.

Scenario 6 shows 15.2 kcfs out through the end of March due to lower inflows, then ramping up to 20 kcfs in April.

Scenario 7 based on 1990 inflows, 2.9 MAF, has 18 kcfs releases with a drop to 8 kcfs for the 2 day hatchery release and then increase to 18 kcfs to reach the April 15 FRM elevation.

Scenario 8 based on 1990 inflows, 2.9 MAF, has 16.9 kcfs releases March and April to reach the April 15 FRM elevation.

Scenario 9 based on 1990 inflows, 2.9 MAF, has a typical FRM operation with 14.2 kcfs discharged through end of March then increasing to 21.8 kcfs discharges to reach the April 15 FRM elevation.

Hall said that additional COE modeling indicates a 3 maf runoff volume forecast would require Dworshak releases of 25 kcfs from March 20-April 15 in order to reach the April 15 FRM elevation of 1445 ft. That's considerably lower than the current April 15 FRM elevation of 1471 ft.

Margaret Filardo, FPC, asked about the end of April elevation. It will be 1471.1 ft, the same as April 15, unless the reservoir intersects the FCRC before then, Hall replied. At that point the reservoir elevation would follow the FCRC curve, passing inflows. Hall noted that an atmospheric river like those seen recently in California could increase inflows in the Northwest. Flood control upper rule curves are designed to handle the precipitation and snow an atmospheric river would spread across the basin. In general, more than 3 inches of SWE per day leads to large inflows because typically only 3

inches can melt in a day. The Columbia basin projects have relatively small storage capacity (around 20-25%) compared to annual runoff volume. Flood control rule curves must be followed in order to avoid damage to Portland, the Tri Cities and other major population centers along the Columbia River.

Dave Swank, USFWS, wondered how to reconcile the prediction of heavy precipitation over the next few days with the recent drop in the 10 day forecast. Jay Hesse, Nez Perce, commented that the RFC projection for runoff volume in the basin could be off by 2.7 maf for April-July. Dave Statler, Nez Perce, commented that variation in forecasts should be part of the "out of the box" thinking about the current dilemma.

2f. Fish Passage Center Memo. Dave Benner, FPC, presented four scenarios he prepared to illustrate Dworshak operations. He used past years' March final forecasts to extrapolate the April 15 (1473.5 ft) and April 30 (1502 ft) FRM elevations because the actual elevations were not available yet when he prepared the scenarios.

Scenario 1 uses the current water supply forecast and the latest STP inflows. For April-July volume he used inflows from 1984, a 2.8 maf year with median runoff (number 22 out of the last 44 years). Dworshak discharges are 15.3 kcfs through April 15 in order to reach the 1473.5 ft elevation. Then discharges drop to 4.5 kcfs for 6 weeks and to minimums during refill in June.

Scenario 2 uses the same inflow data from 1984 as the first scenario, but operates to a 1502 ft April 30 FRM elevation instead of the April 15 target of 1473.5 ft. This results in more moderate outflows through the end of April.

Scenario 3 is based on similar assumptions but uses water year 1985, which had a 2.9 runoff volume. It was the 10th highest runoff in 44 years and slightly higher than the current forecast, with heavy April inflows. To reach the April 15 FRM elevation of 1473.5 ft, Dworshak discharges were 17.3 kcfs through April 15, followed by 4.5 kcfs out for most of refill and finally, 1.6 kcfs out for a week.

Scenario 4 uses the 1985 inflow volume of 2.9 maf but targets the April 30 FRM elevation of 1502 ft on both April 15 and 30. To achieve that target, Dworshak releases are 14 kcfs through April 30, then drop to 4.5 kcfs through the refill period. This is the hatchery-preferred scenario.

It was clarified that none of these scenarios include a 2 day drop to 8 kcfs for the combined fish hatchery release at the end of March, which could be added. The Salmon Managers responded to the scenarios:

Charles Morrill, Washington, asked what it would take to model current flows according to the assumptions in Scenario 4, including the likelihood that the current forecast underestimates actual inflows. Benner said higher STP inflows could make this more difficult in April. He will re-run the scenario taking this into account. The end of

April FRM elevation is challenging for the COE to compute because FRM guidance in March assumes average reservoir space, Hall added.

One of the main points of today's meeting was to hear hatchery perspectives. FPAC's main concern is the effects of high TDG on hatchery populations, Paul Wagner, NOAA, reported.

Jay Hesse, Nez Perce, requested that TMT have a conversation about "out of the box" thinking from both a biological and flow management perspective.

Dave Swank reported on yesterday's consultation with **USFWS and Nez Perce managers at Dworshak hatchery**. They have examined all cohorts of fish along with the best options for protecting each from high TDG levels. They looked at options like early release and moving fish to another hatchery temporarily. It was generally agreed that moving 1.6 million spring chinook smolts is impractical and would probably be unsuccessful, so it's viewed as a last resort. Another last-resort option is early release, which would probably also fail. So the hatchery managers decided the best course of action is to monitor TDG levels and watch the fish closely for signs of trouble. They also talked about delaying the hatch of new eggs for as long as possible, which would buy some time for next year's fish. A few cohorts will be kept in incubation water until April if necessary.

The USFWS and Nez Perce hatchery managers came up with a flow recommendation – an incremental release of 500 cfs per day, with a pause if TDG saturation levels in the hatchery reach 105% or greater. A stepped approach would allow hatchery managers to assess the impact on fish as TDG levels increase and to monitor how well the degassers are working.

Russ Kiefer reported on the **Idaho** hatchery perspective. Use of the settling ponds has been ruled out as an emergency operation. For brood year 2015 smolts, the options for relocation are slim. There's a possibility of trucking them to the headwaters of the Red River for a short time, but that's not good because the fish hatchery would have to be reprogrammed. The best option for these fish is to use the degassers and possibly add oxygen to the raceways. The IDFG steelhead release is scheduled for April 10-18. IDFG has requested a half day of no spill for divers to clean the intake screens. For brood year 2016 fish, chilling can delay their need to go to ponds.

Howard Schaller, USFWS, agreed it would be extremely risky to move this year's smolts. Flow oxygenation is probably not an option at Dworshak hatchery either due to lack of equipment. Early release is also risky. There are no good options. The best approach is to increase flows one step at a time and see what happens. Yesterday TDG levels in the hatchery peaked at 103%.

Bill Proctor, COE, suggested using portable oxygen but Dworshak hatchery doesn't have the hardware to apply it (that's planned for the future). The COE is in the process of mobilizing a small team of degassing experts to monitor TDG in the

hatchery. Hall shared with TMT the latest RFC 10 day inflow projections for DWR, just posted. A small bump to 13 kcfs inflows is expected over the weekend, plus a bump to 30 kcfs on March 10.

Due to the high levels of concern expressed and the complexities of the dilemma at hand, the Action Agencies and the Salmon Managers both felt the need for a caucus.

After the caucus the COE presented the Salmon Managers with two options for operating Dworshak for the next 10 days to a March 31 FRM elevation of 1493 ft:

- **Option 1**: Dworshak discharges increase immediately to 17 kcfs and flows remain flat for as long as possible, backing off to 8 kcfs for 2 days at the end of March to facilitate the combined hatchery release. Discharges will be increased as needed, possibly to 21-25 kcfs out through April.

- **Option 2**: Starting at midnight tonight, Dworshak discharges increase gradually by 1 kcfs per day including weekends from the current 12.5 kcfs out to 22 kcfs by approximately March 13. Discharges then remain flat at 22 kcfs until flood control requirements force them higher, possibly up to 25 kcfs if the April-July inflow forecast rises to 3 maf. This option also backs off to 8 kcfs for 2 days at the end of March to facilitate the hatchery release.

Both of these options draft DWR down to the March 31 and April 15 FRM elevations. It was emphasized that the COE is required to draft to FRM elevations. It might be possible to move the 2 day window from the end of the month to an earlier time with 2-3 days' advance notice, or to hold discharges at a given level for more than a day if problems occur at the hatchery.

After noting that both options would clearly have adverse impacts on fish, the Salmon Managers decided to confer with hatchery experts and reconvene TMT in the afternoon.

When TMT reconvened at 3pm, Becky Johnson, Nez Perce, spoke for the USFWS and Nez Perce hatcheries in choosing **Option 2** because it buys some time to test the degassers above 120% TDG in the river and assess the impacts on fish of higher TDG levels. Howard Schaller, USFWS, said it's important for the COE to revisit with TMT any changes in forecasted inflows to DWR as discharges ramp up. Johnson said hatchery managers are also considering the option of releasing fish in themainstem Clearwater, which would eliminate the need for 2 days of 8 kcfs flows for a release in the North Fork Clearwater.

Jay Hesse asked what kind of ESA coverage might apply to the potential impacts on fall chinook in the river and on plans to monitor that impact. Tony Norris said flood risk management specifications are included in the BiOp. Paul Wagner said he will follow up on this in terms of how previous TDG exceedances in the Clearwater River were covered in the BiOp. Hesse reiterated his earlier request to target the April 30

flood control target instead of April 15. But April 30 is too far away to know now what the target will be, Proctor said. It could be as low as 1445 ft, not the 1502 ft assumed in the FPC scenarios.

The Salmon Managers emphasized that neither option was palatable. Howard Schaller said both options would produce very poor conditions for fish and could result in significant mortalities. Jay Hesse said the situation is dire and calls for “out of the box” thinking – if we don’t use adaptive management techniques now and TDG levels spike, there might be no fish to benefit from adaptive management later in the season.

Recognizing the decision is difficult for anyone, Hall said the COE will implement Option 2 immediately, while monitoring TDG in the hatchery and assisting with degassing opportunities if possible. After discussion, it was determined that the daily increase to 1 kcfs discharge would be more convenient for hatchery workers if it happens at 8 pm rather than at midnight. The COE will implement the first increase at 8 pm this evening and continue to do so if that works out.

3. Next TMT Meeting

TMT will meet next in a conference call on March 8.

Name	***Affiliation***
Russ Kiefer	Idaho
Jay Hesse	Nez Perce Tribe
Dave Swank	USFWS
Tom Lorz	CRITFC
Jim Litchfield	Montana
Mary Mellema	BOR
Paul Wagner	NOAA
Tony Norris	BPA
Julie Ammann	COE
Doug Baus	COE
Steve Hall	COE Walla Walla
Dave Statler	Nez Perce
Dave Benner	FPC
Margaret Filardo	FPC
Andy Goodwin	USFWS
Howard Schaller	USFWS
Michael Bryant	CBB
Tom Iverson	Yakama Nation
Charles Morrill	Washington
Ron Malmgren	COE
Bill Proctor	COE
Lisa Wright	COE
Eric Hockersmith	COE
Chris Pinney	COE

Chris XX	USFWS
Steve Rogers	XX
Jeremy XX	DWR
Becky Johnson	Nez Perce
Erick Van Dyke	Oregon
Scott Bettin	BPA
Laura Hamilton	COE
Aaron Marshall	COE
Marilyn Blair	Idaho
Charles Wiggins	DSC
Chris Barrow	USFWS